We claim:

1. A method for regulating functional T cell responses comprising contacting CD28 positive T cells with a ligand for CD28 receptor.

2. The method of claim 1 wherein said ligand is B7 antigen.

3. The method of claim 2 wherein said T cells are contacted with a fragment or derivative of said B7 antigen.

4. The method of claim 3 wherein said fragment or derivative contains at least a portion of the extracellular domain of the B7 antigen.

5. The method of claim 4 wherein said fragment is a polypeptide having an amino acid sequence containing amino acid residues from about position 1 to about position 215 of the amino acid sequence corresponding to the extracellular domain of B7 antigen.

6. The method of claim 4 wherein said derivative comprises a fusion polypeptide having a first amino acid sequence corresponding to the extracellular domain of B7 antigen and a second amino acid sequence corresponding to a moiety that alters the solubility, affinity and/or valency of said B7 antigen for binding to the CD28 receptor.

7. The method of claim 6 wherein said moiety is an immunoglobulin constant region.

8. The method of claim 6 wherein said derivative comprises a fusion polypeptide having a first amino acid sequence containing amino acid residues from about position 1 to about position 215 of the amino acid sequence corresponding to the extracellular domain of B7 antigen and a second amino acid sequence corresponding to the hinge, CH2 and CH3 regions of human immunoglobulin Cγ1.

9. The method of claim 1 wherein said B7 antigen is immobilized to crosslink CD28 receptor on said T cells.

10. The method of claim 9 wherein said T cells are reacted with CHO cells expressing B7 antigen.

11. B7Ig fusion protein reactive with the CD28 receptor on T cells comprising a polypeptide having a first amino acid sequence containing amino acid residues from about position 1 to about position 215 of the amino acid sequence encoding the extracellular domain of B7 antigen and a second amino acid sequence corresponding to the hinge, CH2 and CH3 regions of human immunoglobulin Cγ1.

12. B7Ig fusion protein corresponding to the amino acid sequence encoded by DNA having ATCC No. 68627.

13. The method of claim 1 wherein said B7 antigen is administered <u>in vivo</u> and further comprising administrating a cytokine.

14. The method of claim 13 wherein said cytokine is selected from the group consisting of interleukins, interferons, transforming growth factors, tumor necrosis factors and colony stimulating factors.

15. The method of claim 1 further comprising adding anti-CD antibody to co-react with said T cells.

16. The method of claim 15 wherein said anti-CD antibody is anti-CD2 or anti-CD3 monoclonal antibody.

17. The method of claim 1 wherein said T cells are reacted with B cells expressing B7 antigen and said T cell responses are stimulated.

18. The method of claim 1 wherein said T cells are reacted with the ligand in soluble form and said T cell responses are inhibited.

19. A method for regulating functional T cell responses comprising reacting B7 positive cells with a ligand reactive with B7 antigen.

20. The method of claim 19 wherein said ligand reactive with B7 antigen is soluble and the interaction of said B7 positive cells with said T cells is inhibited.

21. The method of claim 19 wherein said ligand is a Fab fragment of a monoclonal antibody reactive with B7 antigen. and said T cell responses are inhibited.

22. The method of claim 21 wherein said monoclonal antibody is mAb BB-1.

23. The method of claim 21 wherein said monoclonal antibody is reactive with a fusion protein comprising a polypeptide having a first amino acid sequence containing amino acid residues from about position 1 to about position 215 of the amino acid sequence corresponding to the extracellular domain of B7 antigen and a second amino acid sequence corresponding to the hinge, CH2 and CH3 regions of human immunoglobulin Cγ1.

24. The method of claim 23 wherein said fusion protein is B7Ig corresponding to the amino acid sequence encoded by DNA having ATCC No. 68627.

25. A monoclonal antibody reactive with a fusion protein comprising a polypeptide having a first amino acid sequence containing amino acid residues from about position 1 to about position 215 of the amino acid sequence corresponding to the extracellular domain of B7 antigen and a second amino acid sequence corresponding to the hinge, CH2 and CH3 regions of human immunoglobulin Cγ1.

26. The method of claim 19 wherein said ligand is CD28 receptor and said T cell responses are inhibited.

27. The method of claim 26 wherein said ligand is a fragment or derivative of CD28 receptor.

28. The method of claim 27 wherein said fragment or derivative contains at least a portion of the extracellular domain of the CD28 receptor.

29. The method of claim 27 wherein said fragment is a polypeptide having an amino acid sequence containing amino acid residues from about position 1 to about position 134 of the amino acid sequence corresponding to the extracellular domain of CD28 receptor.

30. The method of claim 27 wherein said derivative comprises a fusion polypeptide having a first amino acid sequence corresponding to the extracellular domain of CD28 receptor and a second amino acid sequence corresponding to a moiety that alters the solubility, affinity and/or valency of said CD28 receptor for binding to B7 antigen.

31. The method of claim 30 wherein said moiety is an immunoglobulin constant region.

32. The method of claim 27 wherein said derivative is a CD28 fusion protein comprising a polypeptide having a first amino acid sequence containing amino acid residues from about position 1 to about position 134 of the amino acid sequence corresponding to the extracellular domain of CD28 receptor and a second amino acid sequence corresponding to the hinge, CH2 and CH3 regions of human immunoglobulin Cγ1.

33. CD28Ig fusion protein reactive with B7 antigen comprising a polypeptide having a first amino acid sequence containing amino acid residues from about position 1 to about position 134 of the amino acid sequence corresponding to the extracellular domain of CD28 receptor and a second amino acid sequence corresponding to the hinge, CH2 and CH3 regions of human immunoglobulin Cγ1.

34. CD28Ig fusion protein corresponding to the amino acid sequence encoded by DNA having ATCC No. 68628.

35. A method for inhibiting functional T cell responses comprising contacting CD28 positive T cells with a ligand reactive with CD28 receptor to prevent binding of said receptor to B7 antigen.

36. The method of claim 35 wherein said ligand is an anti-CD28 monoclonal antibody.

37. The method of claim 36 wherein said ligand is a Fab fragment of anti-CD28 monoclonal antibody.

38. The method of claim 36 wherein said antibody is 9.3 monoclonal antibody produced by hybridoma ATCC No. HB10271.

39. The method of claim 36 wherein said anti-CD28 antibody is reactive with a fusion protein comprising a polypeptide having a first amino acid sequence containing amino acid residues from about position 1 to about position 134 of the amino acid sequence corresponding to the extracellular domain of CD28 receptor and a second amino acid sequence corresponding to the hinge, CH2 and CH3 regions of human immunoglobulin Cγ1.

40. The method of claim 39 wherein said fusion protein is CD28Ig fusion protein corresponding to the amino acid sequence encoded by DNA having ATCC No. 68628.

41. The method of claim 35 wherein said ligand reactive with CD28 receptor is B7 antigen or a fragment or derivative of B7 antigen.

42. The method of claim 41 wherein said derivative is a B7Ig fusion protein.

43. A monoclonal antibody reactive with a fusion protein comprising a polypeptide having a first amino acid sequence containing amino acid residues from about position 1 to about position 134 of the amino acid sequence corresponding to the extracellular domain of CD28 receptor and a second amino acid sequence corresponding to the hinge, CH2 and CH3 regions of human immunoglobulin Cγ1.

44. The monoclonal antibody of claim 43 reactive with CD28Ig having ATCC No. 68628.

45. A method for regulating the level of cytokines in vivo comprising administering to a subject a ligand reactive with CD28 receptor to bind to said CD28 receptor and inhibit the production of cytokines by said T cells.

46. The method of claim 45 wherein said ligand is B7 antigen.

47. The method of claim 45 wherein said ligand contains a portion of the extracellular domain of the B7 antigen.

48. The method of claim 47 wherein said ligand is a soluble B7Ig fusion protein.

49. The method of claim 48 wherein said B7Ig fusion protein is B7Ig corresponding to the amino acid sequence encoded by DNA having ATCC No. 68627.

50. The method of claim 45 wherein said ligand is a Fab fragment of anti-CD28 monoclonal antibody.

51. The method of claim 45 wherein said cytokines are selected from the group consisting of interleukins, interferons, transforming growth factors, tumor necrosis factor and colony stimulating factors.

52. A method for treating immune system diseases mediated by CD28 positive T cell interactions with B7 positive cells comprising administering to a subject a ligand for CD28 receptor to regulate the functional T cell response and/or to regulate cytokine levels.

53. The method of claim 52 wherein said ligand is B7 antigen.

54. The method of claim 52 wherein said ligand is soluble B7Ig fusion protein and said functional T cell response is inhibited.

55. The method of claim 52 wherein said ligand is anti-CD28 monoclonal antibody and said functional T cell response is inhibited.

56. The method of claim 52 wherein said ligand aggregates said CD28 receptor and said functional T cell response is stimulated.

57. The method of claim 56 wherein said ligand is immobilized B7 antigen.

58. The method of claim 52 wherein said cytokine is selected from the group consisting of interleukins, interferons, tumor growth factors, tumor necrosis factors and colony stimulating factors.

59. A method for treating cancer associated with expression of B7 antigen <u>in vivo</u> comprising administering to a subject ligand reactive with B7 antigen.

60. The method of claim 59 wherein said ligand is selected from the group consisting of anti-B7 monoclonal antibody, CD28 antigen and CD28Ig fusion protein.

61. The method of claim 59 wherein said cancer is B7 lymphoma.

62. The method of claim 59 wherein said cancer is T cell leukemia.

63. A method for inhibiting T cell proliferation in graft versus host disease comprising contacting T cells with a ligand for CD28 receptor and an immunosuppressant.

64. The method of claim 63 wherein said ligand for CD28 receptor is soluble B7 antigen.

65. The method of claim 63 wherein said ligand for CD28 receptor is soluble B7Ig fusion protein.

66. The method of claim 63 wherein said immunosuppressant is cyclosporine.

67. An assay method to detect a ligand reactive with a target receptor mediating cellular adhesion system comprising:

a) labeling test cells suspected of expressing ligand for a target receptor to form labeled test cells;

b) contacting said labeled test cells with cells expressing target receptor in a medium lacking divalent cations; and

c) determining whether the labeled test cells bind to said cells expressing target receptor,

whereby the presence of ligand reactive with said target receptor is detected.

68. The assay method of claim 67 wherein said target receptor is a receptor on lymphocytes.

69. The assay method of claim 68 wherein said target receptor is a receptor on T cells.

70. The assay method of claim 69 wherein the target receptor is CD28 and the ligand is B7 antigen.

71. The assay method of claim 67 wherein said target receptor is a receptor on B cells.

72. The assay method of claim 67 wherein said medium contains a divalent cation depletion reagent selected from the group consisting of EDTA and EGTA.

73. The assay method of claim 72 further comprising the step of fixing said cells expressing target receptor prior to addition of said reagent for depleting divalent cations.

74. The assay method of claim 73 wherein said step of fixing is carried out using paraformaldehyde.

75. The assay method of claim 67 wherein said cells expressing target receptor are grown in a monolayer prior to adding said test cells.

76. The assay method of claim 67 wherein said test cells are B cells and said cells expressing target receptor are chinese hamster ovary cells.